

REMARKS

The Examiner's Action mailed February 26, 2004 has been received and its contents carefully considered.

Claims 1-10 were originally pending in this application. The Applicant notes with appreciation the Examiner's early indication that original claims 3-8 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In this Amendment, claims 1-10 are cancelled without prejudice or waiver. New claims 11-29 are added herein. Allowable claims 3-8 are rewritten as new claims 14, 15, 19, 21, 23 and 16, respectively. Rejected claims 1, 2, 9 and 10 are rewritten as new claims 11, 13, 25, and 26, respectively. Claims 12, 17, 18, 20, 22, 24 and 27-29 are newly added to protect additional features of the invention disclosed in the application. New claims 11, 26 and 27 are independent claims.

In the Action, original claim 10 is rejected under 35 U.S.C 102(b) as being anticipated by Shimizaki et al. (U.S. Patent No. 6,134,397) or Shimizu et al. (JP2-301789A). Original claims 1-2 and 9-10 are rejected under 35 U.S.C 103(a) as being obvious over Shimizaki et al. in view of Shimizu et al. For at least the following reasons, it is respectfully submitted that the new claims added by this Amendment patentably distinguish over the applied prior art references, whether considered individually or in combination.

There are three principal features of the present invention that are disclosed in the specification and emphasized in the independent claims. The first feature is to detect the image density from image data for the image being presently developed, such as the dot number in a prescribed area, a sheet of A4 paper, for example. By adjusting the voltages of the developing roller and the developing material supplying roller using this density data at the time of printing, a clear printing can be obtained at each time. This feature is recited in claim 11 (former claim 1, amended).

The second feature concerns memory capacity. The first setting value for deciding the first voltage is a single value. The plurality of values for deciding the second voltage are voltage differences. Therefore, this plurality of values have small magnitudes, and large

memory area is not required for storing these values. Thus, adequate density control can be obtained by using a controller that is rather simple and inexpensive. This feature is the basis of claim 26 (former claim 10 amended).

The third feature is to use what is referred to as "an amount of operation", for controlling voltage, as a principal parameter. Thereby, appropriate control of image density can be obtained. This feature is recited in claim 27 (newly added).

Unlike the present invention, the Shimazaki reference discloses a developing device in which developing bias is determined according to a prescribed density setting value being set by an operator beforehand. Oka, which is cited, but not relied upon, discloses a developing device that adjusts toner quantity by changing the bias impressed at a toner feeding roller for the purpose of recycling toner not fed to a developing sleeve. In this case also, the bias is set according to an operator's selection. Shimizu discloses a developing device in which toner recycling bias is set according to a density of an image previously developed, so as to determine a density value for a succeeding image to be developed. It is respectfully submitted that these prior art references, whether considered individually or in combination, fail to teach or suggest the three principal features identified above. An analysis follows.

Shimazaki determines developing bias according to a prescribed density setting value when an operator sets a density. Then it determines an electric potential difference between the toner supplying roller and the developing roller according to said developing bias (column 4, lines 58-63). In other words, Shimazaki determines bias voltage based on an operator's setting value inputted beforehand. Thus, Shimazaki, as acknowledged by the Examiner, fails to disclose an image density detecting means for detecting image density from image data, as claim 11 requires.

Further, the image density controlling means of Shimazuki causes the developing bias power supply and the toner supply roller bias power supply to change their output keeping a relative relationship (column 4, lines 60-63). But there is no suggestion that the apparatus in Shimazuki stores a plurality of voltage differences corresponding to a plurality of apparatus states, as claim 26 requires.

Moreover, regarding the third feature, Shimazuki cannot restrain deterioration of printed images resulting from amount of operation of the apparatus because voltage correction according to operation amount is not performed, as claim 27 would require..

Oka impresses a toner supply roller with a bias for recycling toner, for the purpose of recycling toner not supplied to the developing roller. Oka controls this bias in order to adjust toner density in the case of developing. Oka has a selection key for photographic copy mode and standard copy mode, for an operator to use. The voltage of the developing section is set according to selection between standard copy mode and photographic copy mode, or a manual setting is inputted by an operator. Further, voltage for recycling toner is set according to the same selection.

Therefore, similarly to Shimazaki, Oka fails to disclose any structure related to the three principal features of claims 11, 26, 27. Nor does it teach any point relevant to the deficiencies in the disclosures of Shimazaki or Shimizu.

Shimizu is provided with a means to measure the density of the image being developed, which is positioned above a photo-sensitive drum 100 or above the printed sheet (Figure 2). The developing sleeve is impressed with a prescribed developing bias voltage (Vb). Therefore, according to the density of an image developed, the toner recycling bias impressed on the toner supplying roller is set. In other words, Shimizu determines a toner recycling voltage for a succeeding image to be developed, based on the density of an image already developed.

Moreover, it performs density correction only with toner recycling bias for the toner supplying roller, unlike the present invention, which sets the voltage of the developing means according to a density setting and which sets the voltage of the developing material supplying means according to the density setting of the developing means and a state of the apparatus.

Therefore, similarly to Shimazaki and Oka, Shimizu fails to disclose any structure related to the three principal features of claims 11, 26 and 27. Nor does it teach any point relevant to the deficiencies in the disclosures of Shimazaki or Oka

The Applicant believes that claims 12-25 and 28-29 are allowable for at least the reason that they depend from claims 11, 26 and 27.

The Examiner's rejections having been addressed by the new claims, it is submitted that this application, as amended, is in condition for allowance. Such action and the passing of this case to issue, with claims 11-29, are respectfully requested.

Should the Examiner feel that a conference would help to expedite the prosecution of this application, the Examiner is hereby invited to contact the undersigned counsel to arrange for such an interview.

Respectfully submitted,



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Date

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